

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Flow regimes in an electromagnetically forced circular Couette system JEAN BOISSON, Unité de Mécanique, UMR 8193, ENSTA-ParisTech, Palaiseau, VINCENT PADILLA, FRANÇOIS DAVIAUD, SÉBASTIEN AUMAÎTRE, SPHYNX-SPEC, DSM, CNRS URA 2464, CEA-Saclay, F-91191 Gif-sur-Yvette, UNITÉ DE MÉCANIQUE, UMR 8193, ENSTA-PARISTECH TEAM, SPHYNX-SPEC, DSM, CNRS URA 2464, CEA-SACLAY TEAM — We present an experimental study of a liquid metal flow electromagnetically forced in a large aspect ratio coaxial cylindrical geometry with and without a free surface. An azimuthal Lorentz force is applied on the liquid metal gap, through a radial current and an axial magnetic field. Using ultrasonic velocity measurements and direct visualisation of the free surface, we focus on the effect of these two parameters on the flow properties. We show that, depending on the strength of the magnetic field and not only on the applied Lorentz force, dynamical states exist in the two geometries. We first observe a stationary structure at low forcing. Then, two dynamical regimes are exhibited at higher forcing. We characterize them by their different frequencies and speeds. Higher magnetic fields clearly promote the faster regimes. Connections with other magnetohydrodynamics instabilities will be discussed.

Olivier Cadot
Unité de Mécanique, UMR 8193, ENSTA-ParisTech, Palaiseau

Date submitted: 30 Jul 2014

Electronic form version 1.4